

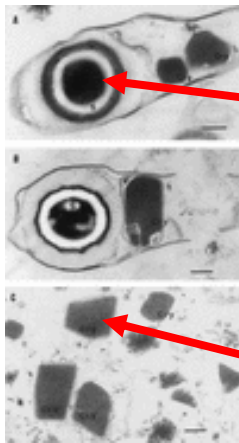
BIOLOGICAL CONTROL

In an integrated Pest management Program, biological control of mosquitoes is an important component. Naturally there are several predators of these insect both as larvae and adults. Some larval predators include bacteria, several insects such as dragonfly and damselfly nymphs, aquatic hemipterans and several species of beetles, fish, birds and bats.

BACTERIA

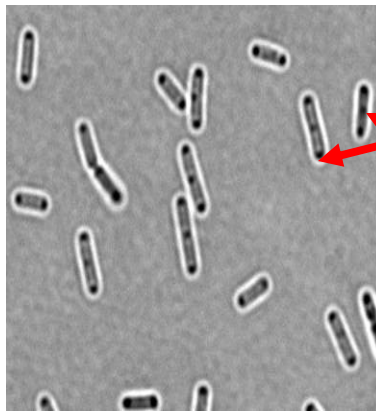
Two species of *Bacillus*, a rod shaped bacterium, are important in mosquito larval control. The active ingredients of VectoBac are spores and crystalline toxins produced by *Bacillus thuringiensis israelensis* (Bti), a bacterium that naturally occurs in soil. These spores and toxins target specific mosquitoes, black flies and some midges with no adverse effects on fish and other vertebrate wildlife.

The active ingredient of VectoLex is a delta-endotoxin produced by *Bacillus sphaericus* (Bs) a spore forming bacteria found in soil throughout the world. This environmental friendly product is often used to treat catch basin, drains and ornamental ponds.

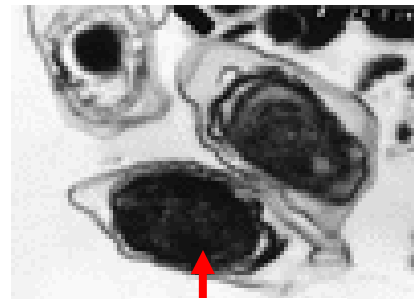


Bs spore

Bs crystal



Bacillus sphaericus bacteria



Bti spore

FISH

Western mosquito fish

In the thirties, the Western mosquito fish, *Gambusia affinis*, was introduced into the Saratoga warm springs at the north end of Utah Lake. There is approximately 395,381 lineal feet or about 75 miles of shoreline around Utah Lake. The land elevation is not much different than the water level as seen in the past few years of lake flooding. This fluctuation of flooding and drying is the ideal environment mosquitoes need for egg laying and larval development.

Since that introduction, the tiny fish has established a surviving population in the lake marshes and some of its small tributaries. It is a small, live bearing, guppy-like fish with a mouth located dorsally, ideal for surface feeding. It has become a successful predator of mosquito larvae particularly when larvae surface to obtain oxygen.

In past years, the Western Mosquito fish, potential areas were evaluated for the introduction of *Gambusia* as a control. If favorable habitat was located they were planted in ponds, marshes, drains and ditches where the water will not dry up completely, thus killing the fish. This fish is somewhat sensitive to very



cold winters. Over the years, an over wintering population has been established in many aquatic habits throughout the county.

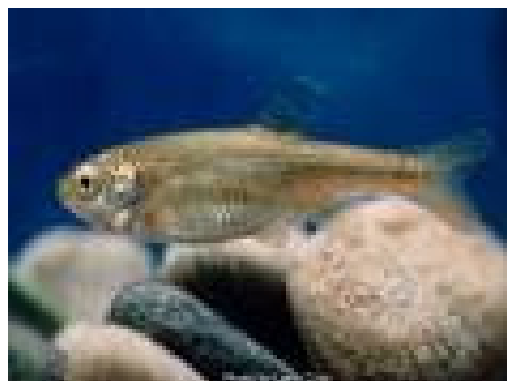
Biological control with the use of *Gambusia affinis* is a working control method. It would be hard to estimate what the mosquito population might be if it were not for the help of this tiny frequently overlooked friend and ally.

Utah County Mosquito abatement does not have the facilities to rear, store and treat this species for public distribution. It should be emphasized that it is not legal to transport any species of live fish to new habitats with out proper permits.

Least Chub



Photo by Paul Thompson



www.fws.gov/fishsprings/images/LEASTChub.

The Division of Natural Resources reports the following: (<http://dwrcdc.nr.utah.gov/>)

“The least chub, *Notichthys phlegethontis*, is a small minnow native to the Bonneville Basin. Although the species formerly occurred in many areas of the Bonneville Basin, including ponds and streams near Salt Lake City and the Great Salt Lake, it now occurs only in scattered springs and streams in western Utah. Much of the least chub's decline can be attributed to the introductions of nonnative fishes. Fortunately, efforts are now underway to expand the numbers and distribution of the least chub.

Spawning occurs during the spring and early summer. Eggs are fertilized in the water, and then sink until they attach to vegetation or the substrate. No parental care is given to eggs or young. Least chub eat primarily algae and small invertebrates, including mosquito larvae. The least chub is a schooling species that prefers areas of dense vegetation in slow-moving water.”

INSECTS, BIRDS, BATS

Utah County Mosquito Abatement recognize the importance of these other natural predators in reducing mosquito populations but are not currently involved in projects with them. Our goal is to have minimal impact on the natural environmental biota in the process of protecting human health.